What is claimed is:

1. An interconnect for a solid oxide fuel cell, comprising:

a non-ionically and non-electrically conductive ceramic gas separator plate comprising at least two ceramic layers;

a plurality of first vias extending through the first separator plate ceramic layer but not through the second separator plate ceramic layer;

a plurality of second vias extending through the second separator plate ceramic layer but not through the first separator plate ceramic layer, wherein the second vias are offset from the first vias;

a plurality of electrically conductive first fillers located in the plurality of first vias; and

a plurality of electrically conductive second fillers located in the plurality of second vias, wherein each of the plurality of first fillers is electrically connected to at least one second filler.

2. The interconnect of claim 1, further comprising an electrically conductive interconnecting body located between the first separator plate ceramic layer and the second separator plate ceramic layer, such that the interconnecting body contacts at least one first filler and at least one second filler to electrically connect at least one first filler to at least one second filler.

3. The interconnect of claim 2, wherein the interconnecting body is selected from a group consisting of a layer, a sheet, a screen, a foil, a platelet, a strip, a wire or an expanded metal.

4. The interconnect of claim 3, wherein the interconnecting body comprises a layer, a sheet, a screen or a foil which extends substantially parallel to gas separator plate surfaces and which electrically connects each of the plurality of first fillers to each of the plurality of second fillers.

5. The interconnect of claim 3, wherein the interconnecting body comprises a platelet, a strip or a wire which electrically connects each of respective first fillers to a single respective second filler.

6. The interconnect of claim 2, further comprising:

a third separator plate ceramic layer, wherein the second separator plate ceramic layer is located between the first and the third separator plate ceramic layers;

a plurality of third vias extending through the third separator plate ceramic layer but not through the first or second separator plate ceramic layers, wherein the third vias are offset from the second vias;

a plurality of electrically conductive third fillers located in the plurality of third vias, wherein each of the plurality of third fillers is electrically connected to at least one second filler; and

a second electrically conductive interconnecting body located between the second separator plate ceramic layer and the third separator plate ceramic layer, such that the second interconnecting body contacts at least one second filler and at least one third filler to electrically connect at least one second filler to at least one third filler.

7. The interconnect of claim 1, wherein:

the gas separator plate comprises a first major surface and a second major surface separated in the separator plate thickness direction;

the separator plate ceramic layers are stacked in the separator plate thickness direction;

the first fillers are exposed below, in or over the first major surface of the separator plate; and

the second fillers are exposed below, in or over the second major surface of the separator plate.

8. The interconnect of claim 7, further comprising gas flow grooves located in the first and the second major surfaces of the separator plate.

9. A solid oxide fuel cell stack, comprising:

a plurality of interconnects of claim 1;

a plurality of solid oxide fuel cells.

10. The stack of claim 9, wherein:

each solid oxide fuel cell comprises a plate shaped fuel cell comprising a ceramic electrolyte, an anode located on a first surface of the electrolyte and a cathode located on a second surface of the electrolyte;

each interconnect is located between adjacent fuel cells in the stack;

each first filler in each interconnect is electrically connected to an adjacent cathode of a first adjacent fuel cell; and

each second filler in each interconnect is electrically connected to an adjacent anode of a second adjacent fuel cell, such that each interconnect electrically connects an anode of a first fuel cell and a cathode of an adjacent second fuel cell.

11. The stack of claim 10, wherein the ceramic gas separator plate comprises ceramic material layers having a coefficient of thermal expansion which is about one percent or less different from a coefficient of thermal expansion of the ceramic electrolyte material of the fuel cells.

12. The stack of claim 11, wherein:

the electrolyte comprises yttria stabilized zirconia;

the ceramic gas separator plate comprises a blend of alumina and yttria stabilized zirconia;

the first and second fillers and the interconnecting body comprise materials selected from a group consisting of at least one of strontium doped lanthanum manganite, strontium doped lanthanum chromite, silver palladium alloys, chromia forming metals, and platinum.

13. An interconnect for a solid oxide fuel cell, comprising:

a non-ionically and non-electrically conductive ceramic gas separator plate comprising opposing major surfaces;

an electrically conductive interconnecting body located inside the ceramic gas separator plate;

a plurality of first vias which extend from the first major surface of the ceramic gas separator plate up to the interconnecting body;

a plurality of second vias which extend from the second major surface of the ceramic gas separator plate up to the interconnecting body, wherein the second vias are offset from the first vias;

a plurality of electrically conductive first fillers located in the plurality of first vias, wherein the first fillers are exposed below, in or over the first major surface of the gas separator plate and the first fillers are located in electrical contact with the interconnecting body; and

a plurality of electrically conductive second fillers located in the plurality of second vias, wherein the second fillers are exposed below, in or over the second major surface of the gas separator plate and the second fillers are located in electrical contact with the interconnecting body.

14. The interconnect of claim 13, wherein the interconnecting body is selected from a group consisting of a layer, a sheet, a screen, a foil, a platelet, a strip, a wire or an expanded metal.

15. The interconnect of claim 14, wherein the interconnecting body comprises a layer, a sheet, a screen or a foil which extends substantially parallel the first and the second gas separator plate surfaces and which electrically connects each of the plurality of first fillers to each of the plurality of second fillers.

16. The interconnect of claim 14, wherein the interconnecting body comprises a platelet, a strip or a wire which electrically connects each of respective first fillers to a single respective second filler.

17. The interconnect of claim 13, wherein:

the ceramic gas separator plate comprises at least two ceramic layers;

the first vias are located in a first ceramic layer;

the second vias are located in a second ceramic layer; and

the interconnecting body is located between the first and the second ceramic layers.

18. The interconnect of claim 13, wherein the ceramic gas separator plate comprises at least three ceramic layers.

19. The interconnect of claim 13, further comprising gas flow grooves located in the first and the second major surfaces of the separator plate.

20. A solid oxide fuel cell stack, comprising:

a plurality of interconnects of claim 13;

a plurality of solid oxide fuel cells.

21. The stack of claim 20, wherein:

each solid oxide fuel cell comprises a plate shaped fuel cell comprising a ceramic electrolyte, an anode located on a first surface of the electrolyte and a cathode located on a second surface of the electrolyte;

each interconnect is located between adjacent fuel cells in the stack;

each first filler in each interconnect is electrically connected to an adjacent cathode of a first adjacent fuel cell; and

each second filler in each interconnect is electrically connected to an adjacent anode of a second adjacent fuel cell, such that each interconnect electrically connects an anode of a first fuel cell and a cathode of an adjacent second fuel cell.

22. The stack of claim 21, wherein the ceramic gas separator plate comprises a ceramic material having a coefficient of thermal expansion which is about one percent or less different from a coefficient of thermal expansion of the ceramic electrolyte material of the fuel cells.

23. The stack of claim 22, wherein:

the electrolyte comprises yttria stabilized zirconia;

the ceramic gas separator plate comprises a blend of alumina and yttria stabilized zirconia;

the first and second fillers and the interconnecting body comprise materials selected from a group consisting of at least one of strontium doped lanthanum manganite, strontium doped lanthanum chromite, silver palladium alloys, chromia forming metals, and platinum.

24. A method of making an interconnect for a solid oxide fuel cell, comprising:

providing at least two non-ionically and non-electrically conductive ceramic layers;

forming a plurality of first vias extending through the first ceramic layer;

forming a plurality of second vias extending through the second ceramic layer;

laminating the first ceramic layer and the second ceramic layer to form a ceramic gas separator plate, wherein the first vias are offset from the second vias in the laminated layers;

forming a plurality of electrically conductive first fillers in the plurality of first vias; and

forming a plurality of electrically conductive second fillers in the plurality of second vias, such that each of the plurality of first fillers is electrically connected to at least one second filler.

25. The method of claim 24, further comprising:

forming an electrically conductive interconnecting body on at least one of the first ceramic layer and the second ceramic layer prior to laminating the first ceramic layer and the second ceramic layer; and

laminating the first ceramic layer and the second ceramic layer such that the interconnecting body is located between the first and the second ceramic layers.

26. The method of claim 25, wherein:

the step of forming the interconnecting body comprises forming the interconnecting body on a surface of the first or the second unsintered ceramic layer;

the step of laminating the first and the second ceramic layers comprises laminating unsintered first and second ceramic layers after the step of forming the interconnecting body;

the step of forming the first vias comprises forming the first vias in the first unsintered ceramic layer;

the step of forming the second vias comprises forming the second vias in the second unsintered ceramic layer; and

the steps of forming the first and the second fillers comprising forming the fillers such that the interconnecting body contacts at least one first filler and at least one second filler to electrically connect at least one first filler to at least one second filler.

27. The method of claim 25, further comprising:

sintering the laminated first and second ceramic layers to form a sintered ceramic gas separator plate;

filling the first vias with the first fillers after the step of sintering; and

filling the second vias with the second fillers after the step of sintering.

28. The method of claim 24, wherein the interconnecting body comprises a layer, a sheet, a screen, a foil, a platelet, a strip, a wire or an expanded metal.

29. The method of claim 28, wherein the interconnecting body comprises a layer, a sheet, a screen or a foil which electrically connects each of the plurality of first fillers to each of the plurality of second fillers.

30. The method of claim 28, wherein the interconnecting body comprises a platelet, a strip or a wire which electrically connects each of respective first fillers to a single respective second filler.

31. The method of claim 25, further comprising:

forming a third ceramic layer;

forming plurality of third vias extending through the third ceramic layer;

forming a second electrically conductive interconnecting body on at least one of the second and the third ceramic layers;

laminating the perforated third ceramic layer with the first and the second ceramic layers, wherein:

the second ceramic layer is located between the first and the third ceramic layers;

the second interconnecting body is located between the second and the third ceramic layers; and

the third vias are offset from the second vias; and

forming a plurality of electrically conductive third fillers located in the plurality of third vias, wherein each of the plurality of third fillers is contacts the second interconnecting body.

32. The method of claim 24, further comprising forming gas flow grooves in the first and the second ceramic layers such that the gas flow grooves are located in the first and the second major surfaces of the laminated gas separator plate.

33. A method of making solid oxide fuel cell stack, comprising:

providing a plurality of solid oxide fuel cells; and

providing one of a plurality of interconnects made by the method of claim 24 between adjacent solid oxide fuel cells.

34. The method of claim 33, wherein:

each solid oxide fuel cell comprises a plate shaped fuel cell comprising a ceramic electrolyte, an anode located on a first surface of

the electrolyte and a cathode located on a second surface of the electrolyte;

each interconnect is located between adjacent fuel cells in the stack;

each first filler in each interconnect is electrically connected to an adjacent cathode of a first adjacent fuel cell; and

each second filler in each interconnect is electrically connected to an adjacent anode of a second adjacent fuel cell, such that each interconnect electrically connects an anode of a first fuel cell and a cathode of an adjacent second fuel cell.

35. The method of claim 34, wherein the ceramic gas separator plate comprises ceramic material layers having a coefficient of thermal expansion which is about one percent or less different from a coefficient of thermal expansion of the ceramic electrolyte material of the fuel cells.

36. The method of claim 35, wherein:

the electrolyte comprises yttria stabilized zirconia;

the ceramic gas separator plate comprises a blend of alumina and yttria stabilized zirconia;

the first and second fillers and the interconnecting body comprise materials selected from a group consisting of at least one of strontium doped lanthanum manganite, strontium doped lanthanum chromite, silver palladium alloys, chromia forming metals, and platinum.